

The Relative Global Consequences of Cumulative Distribution of Covid-19, Using the USA as Comparism Factor and Cumulative Covid -19 Data of 31st October 2021



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ABSTRACT: COVID -19 have affected over 200 million and killed about 5 million people globally. Many steps have been taken to understand its dynamics, etiology and infectivity. Several approach have also been taken to control and manage the virus, while vaccines have been developed to prevent the rate of infectivity. Because of complete lack of knowledge of the virus, shortage in vaccine supply etc, understanding how the virus spread per country may determine relativity in vaccine emergency. The aim of this study is to determine the relative global consequences of cumulative distribution of Covid-19, using the USA as comparism factor and cumulative covid -19 data of 31st October 2021. Data from one hundred and fifty four countries were selected based on their continents, countries and cases of infection. Data were obtained from United Nations Geoscheme and WHO. They were analyzed and compared to that of the United State of America (USA) value. Data analyzed showed that most Africa countries are least to be affected while Americans and Europeans appear to be most affected. Result from the study shows that Africa may have develop mechanisms to cope and survive the virus pandemic compared to other region of the world. Hence, vaccine priority may be considered base on infectivity and severity of infection.

KEYWORD: Africa, USA, COVID-19, countries, continent

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. The first known case was identified in Wuhan, China, in December 2019[2]. The disease has since spread worldwide, leading to an ongoing pandemic. Symptoms of COVID-19 are variable, but often include cough, fever [3], difficulties in breathing, headache [4], fatigue, and loss of smell and taste [5]. Symptoms usually begin one to fourteen days after been exposed to the virus. At least a third of people who are infected do not develop noticeable symptoms [6]. Of those people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% suffer critical symptoms (respiratory failure, shock, or multiorgan dysfunction) [7]. Older people are usually at a higher risk of developing severe symptoms. Some people, continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed [8]. Multi-year studies are underway to further investigate the long-term effects of the disease [9].

A COVID-19 vaccine is a vaccine intended to provide acquired immunity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19). Prior to the COVID-19 pandemic, a little knowledge existed about the structure and function of coronaviruses causing diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) [10,11]. This knowledge accelerated the development of various vaccine platforms in early 2020[12]. The initial focus of SARS-CoV-2 vaccines was on preventing symptomatic, often severe illness [13]. On 10 January 2020, the SARS-CoV-2 genetic sequence data was shared through GISAID, and by 19 March, the global pharmaceutical industry announced a major commitment to address COVID-19 [14]. The COVID-19 vaccines are widely credited for their role in reducing the spread, severity, and death caused by COVID-19. Many countries have implemented phased distribution plans that prioritize those at highest risk of complications, such as the elderly, and those at high risk of exposure and transmission, such as

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healthcare workers [15]. Recently, recommendations from several institution and research groups have been approved for the vaccination to be extended to children[16].

Multiple variants of the virus that causes COVID-19 have been documented globally, during this pandemic. In the United Kingdom (UK), a new variant has emerged with an unusually large number of mutations. In South Africa, another variant has emerged independently of the variant detected in the UK. Another variant recently emerged in Nigeria and USA[17]. Delta variant was found to be more infectious and was leading to increased transmissibility when compared with other variants, even in some vaccinated individuals[18]. The different waves of the disease has been of concern due to change in weather and mutated strain of the virus identified in some countries[18,19]. There is the need to understand this surge with the virulent and spreading ability of the newly mutated strain of the virus. Also, Several study has been carried out on the demographic strength and nature of the virus, but analyzing an updated information per time is very essential in managing the trend. The aim of this study is to determine the relative global consequences of cumulative distribution of Covid-19, using the USA as comparism factor and cumulative covid -19 data of 31st October 2021.

MATERIAL AND METHOD

A total of one hundred and fifty four (154) countries from different continent and regions of the world were selected from different continents, based on COVID-19 cases in each country. The listed countries and territories with their continental regional classification were based on the United Nations Geoscheme and WHO. Sources and data used were provided under Latest Updates from WHO/World meter's on October 31, 2021⁸. Data obtained for each country cumulative total per 100000 populations was analyzed and directly compared to that of the United State of America (USA). USA was used as a Comparism Factor (CF) because it has one of the best healthcare systems and still highest COVID-19 cases in the world. All data used in these analyses are from publicly available data sets.

STATISTICAL ANALYSIS

Parameters such as cumulative incidences/cases and cumulative deaths of countries per 100000 population were compared against factors obtained for USA. Bivariate analysis, was done with Chi-square test to compare proportions for variables. In reporting these results, country-level characteristics are scaled to represent a comparison of two countries similar in all other respects. Thus, rate ratios greater than one means that higher levels of a given characteristic are associated with higher rates of COVID-19 cases or deaths, while rate ratios less than one means that lower levels of a given characteristic are associated with lower rates of COVID-19 cases or deaths.

RESULT

based on analysed data, with exception of south Africa, Africa is unbotherly affected by the virus when compared to other continents with regards to incidence and death cases when compared to values obtained for the USA. America and Europe have the most infection to population ratio. Result also showed most countries of the world have considerable number of affected citizens (Table 1).

Table 1: Infectious, recovery and mortality rate of COVID-19 based on country

	Name	WHO Region	Cases - CT	Cases - CTPMP (A)	Deaths - CT	Deaths - CTPMP (B)	A/13787.1 (CF1)	B/223.5 (CF2)
1	USA	Americas	45635708	13787.11	739856.00	223.52	1.00	1.00
2	India	South-East Asia	34285814	2484.47	458437.00	33.22	0.18	0.15
3	Brazil	Americas	21804094	10257.88	607694.00	285.89	0.74	1.28
4	The United Kingdom	Europe	9019966	13286.93	140558.00	207.05	0.96	0.93
5	Russian Federation	Europe	8513790	5833.98	238538.00	163.46	0.42	0.73
6	Turkey	Europe	8009040	9496.24	70410.00	83.48	0.69	0.37
7	France	Europe	6937450	10666.54	115265.00	177.22	0.77	0.79
8	Iran	Eastern Mediterranean	5916211	7043.70	126126.00	150.16	0.51	0.67
9	Argentina	Americas	5288807	11702.00	115950.00	256.55	0.85	1.15

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10	Spain	Europe	5011149	10587.10	87368.00	184.58	0.77	0.83
11	Colombia	Americas	5000677	9827.82	127258.00	250.10	0.71	1.12
12	Italy	Europe	4767440	7993.50	132074.00	221.45	0.58	0.99
13	Germany	Europe	4597550	5528.11	95729.00	115.11	0.40	0.52
14	Indonesia	South-East Asia	4244358	1551.73	143405.00	52.43	0.11	0.23
15	Mexico	Americas	3805765	2951.74	288276.00	223.59	0.21	1.00
16	Poland	Europe	3025247	7969.96	76999.00	202.85	0.58	0.91
17	Ukraine	Europe	2922302	6682.03	67729.00	154.87	0.48	0.69
18	South Africa	Africa	2921886	4926.57	89163.00	150.34	0.36	0.67
19	Philippines	Western Pacific	2787276	2543.57	43172.00	39.40	0.18	0.18
20	Malaysia	Western Pacific	2471642	7636.54	28912.00	89.33	0.55	0.40
21	Peru	Americas	2200908	6675.11	200217.00	607.24	0.48	2.72
22	Netherlands	Europe	2123880	12200.89	18397.00	105.68	0.88	0.47
23	Iraq	Eastern Mediterranean	2054202	5107.10	23138.00	57.53	0.37	0.26
24	Thailand	South-East Asia	1920189	2750.99	19260.00	27.59	0.20	0.12
25	Czechia	Europe	1762902	16485.06	30753.00	287.57	1.20	1.29
26	Japan	Western Pacific	1722864	1362.20	18268.00	14.44	0.10	0.06
27	Canada	Americas	1712128	4536.38	28952.00	76.71	0.33	0.34
28	Chile	Americas	1695048	8867.08	37757.00	197.51	0.64	0.88
29	Romania	Europe	1648031	8526.28	47751.00	247.05	0.62	1.11
30	Bangladesh	South-East Asia	1569539	953.03	27868.00	16.92	0.07	0.08
31	Belgium	Europe	1360650	11808.70	25994.00	225.60	0.86	1.01
32	Israel	Europe	1326966	15330.83	8085.00	93.41	1.11	0.42
33	Pakistan	Eastern Mediterranean	1272345	576.00	28439.00	12.88	0.04	0.06
34	Sweden	Europe	1171512	11343.52	15025.00	145.48	0.82	0.65
35	Serbia	Europe	1137820	16426.57	9890.00	142.78	1.19	0.64
36	Portugal	Europe	1089888	10585.64	18156.00	176.34	0.77	0.79
37	Kazakhstan	Europe	1018841	5426.09	17131.00	91.24	0.39	0.41
38	Cuba	Americas	952001	8404.99	8236.00	72.71	0.61	0.33
39	Morocco	Eastern Mediterranean	945960	2562.84	14667.00	39.74	0.19	0.18
40	Viet Nam	Western Pacific	921122	946.31	22083.00	22.69	0.07	0.10
41	Switzerland	Europe	868896	10039.68	10802.00	124.81	0.73	0.56
42	Hungary	Europe	863419	8837.88	30729.00	314.54	0.64	1.41
43	Jordan	Eastern Mediterranean	860818	8436.80	11028.00	108.08	0.61	0.48
44	Austria	Europe	822264	9237.82	11072.00	124.39	0.67	0.56
45	Nepal	South-East Asia	812570	2788.81	11407.00	39.15	0.20	0.18
46	United Arab Emirates	Eastern Mediterranean	739824	7480.22	2136.00	21.60	0.54	0.10
47	Greece	Europe	739448	6898.76	15894.00	148.29	0.50	0.66
48	Georgia	Europe	719247	18029.97	10045.00	251.81	1.31	1.13
49	Tunisia	Eastern Mediterranean	712581	6029.31	25238.00	213.54	0.44	0.96

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50	Lebanon	Eastern Mediterranean	641339	9396.30	8495.00	124.46	0.68	0.56
51	Guatemala	Americas	601402	3356.87	15050.00	84.01	0.24	0.38
52	Bulgaria	Europe	601035	8646.14	23918.00	344.07	0.63	1.54
53	Belarus	Europe	598132	6329.89	4614.00	48.83	0.46	0.22
54	Costa Rica	Americas	559698	10987.14	7029.00	137.98	0.80	0.62
55	Saudi Arabia	Eastern Mediterranean	548571	1575.73	8793.00	25.26	0.11	0.11
56	Sri Lanka	South-East Asia	541073	2526.81	13743.00	64.18	0.18	0.29
57	Azerbaijan	Europe	529109	5218.46	7049.00	69.52	0.38	0.31
58	Ecuador	Americas	515859	2923.87	32958.00	186.80	0.21	0.84
59	Bolivia (Plurinational State of)	Americas	513584	4399.75	18925.00	162.13	0.32	0.73
60	Myanmar	South-East Asia	500073	919.09	18697.00	34.36	0.07	0.15
61	Slovakia	Europe	483773	8863.76	13034.00	238.81	0.64	1.07
62	Panama	Americas	472534	10951.55	7315.00	169.53	0.79	0.76
63	Croatia	Europe	470348	11590.17	9220.00	227.20	0.84	1.02
64	Paraguay	Americas	461006	6463.42	16246.00	227.77	0.47	1.02
65	Ireland	Europe	443631	8936.17	5436.00	109.50	0.65	0.49
66	Kuwait	Eastern Mediterranean	412653	9662.71	2461.00	57.63	0.70	0.26
67	Lithuania	Europe	408715	14627.84	5873.00	210.19	1.06	0.94
68	Venezuela (Bolivarian Republic of)	Americas	406239	1428.61	4884.00	17.18	0.10	0.08
69	Uruguay	Americas	393718	11334.16	6077.00	174.94	0.82	0.78
70	Denmark	Europe	386251	6633.47	2713.00	46.59	0.48	0.21
71	Honduras	Americas	375381	3789.96	10240.00	103.39	0.27	0.46
72	Republic of Korea	Western Pacific	366386	714.63	2859.00	5.58	0.05	0.02
73	Ethiopia	Africa	364960	317.46	6451.00	5.61	0.02	0.03
74	Libya	Eastern Mediterranean	356655	5190.51	5078.00	73.90	0.38	0.33
75	Mongolia	Western Pacific	346490	10569.23	1638.00	49.97	0.77	0.22
76	Republic of Moldova	Europe	337115	8356.92	7751.00	192.14	0.61	0.86
77	Slovenia	Europe	334188	15945.14	5079.00	242.34	1.16	1.08
78	Egypt	Eastern Mediterranean	330084	322.55	18592.00	18.17	0.02	0.08
79	Armenia	Europe	306739	10351.49	6284.00	212.07	0.75	0.95
80	Oman	Eastern Mediterranean	304281	5958.55	4111.00	80.50	0.43	0.36
81	Bahrain	Eastern Mediterranean	276794	16266.93	1393.00	81.87	1.18	0.37
82	Bosnia and Herzegovina	Europe	253757	7734.57	11528.00	351.38	0.56	1.57
83	Kenya	Africa	253293	471.06	5276.00	9.81	0.03	0.04
84	Qatar	Eastern Mediterranean	239143	8300.54	610.00	21.17	0.60	0.09
85	Nigeria	Africa	211887	102.79	2895.00	1.40	0.01	0.01

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86	Zambia	Africa	209722	1140.79	3661.00	19.91	0.08	0.09
87	Algeria	Africa	206358	470.59	5918.00	13.50	0.03	0.06
88	Norway	Europe	203742	3795.79	900.00	16.77	0.28	0.08
89	North Macedonia	Europe	202203	9705.53	7121.00	341.80	0.70	1.53
90	Singapore	Western Pacific	198374	3390.81	407.00	6.96	0.25	0.03
91	Botswana	Africa	186594	7934.68	2406.00	102.31	0.58	0.46
92	Uzbekistan	Europe	185963	555.62	1323.00	3.95	0.04	0.02
93	Albania	Europe	184887	6424.60	2916.00	101.33	0.47	0.45
94	Puerto Rico	Americas	184812	6460.03	3234.00	113.04	0.47	0.51
95	Kyrgyzstan	Europe	181259	2778.26	2671.00	40.94	0.20	0.18
96	Australia	Western Pacific	170458	668.47	1734.00	6.80	0.05	0.03
97	Finland	Europe	157531	2851.09	1158.00	20.96	0.21	0.09
98	Afghanistan	Eastern Mediterranean	156210	401.28	7272.00	18.68	0.03	0.08
99	Mozambique	Africa	151288	484.04	1930.00	6.18	0.04	0.03
100	Montenegro	Europe	143762	22889.78	2095.00	333.57	1.66	1.49
101	Zimbabwe	Africa	132954	894.54	4677.00	31.47	0.06	0.14
102	Ghana	Africa	130077	418.62	1175.00	3.78	0.03	0.02
103	Namibia	Africa	128886	5072.45	3552.00	139.79	0.37	0.63
104	Uganda	Africa	126171	275.84	3215.00	7.03	0.02	0.03
105	China	Western Pacific	126078	8.57	5696.00	0.39	0.00	0.00
106	Cyprus	Europe	124332	14001.27	574.00	64.64	1.02	0.29
107	Cambodia	Western Pacific	118522	708.91	2788.00	16.68	0.05	0.07
108	Cameroon	Africa	102499	386.12	1686.00	6.35	0.03	0.03
109	Rwanda	Africa	99681	769.61	1328.00	10.25	0.06	0.05
110	Jamaica	Americas	89014	3006.05	2236.00	75.51	0.22	0.34
111	Maldives	South-East Asia	87784	16239.94	243.00	44.96	1.18	0.20
112	Senegal	Africa	73917	441.46	1878.00	11.22	0.03	0.05
113	Angola	Africa	64374	195.87	1708.00	5.20	0.01	0.02
114	Malawi	Africa	61794	323.02	2300.00	12.02	0.02	0.05
115	Côte d'Ivoire	Africa	61292	232.36	695.00	2.64	0.02	0.01
116	Democratic Republic of the Congo	Africa	57556	64.26	1098.00	1.23	0.00	0.01
117	Trinidad and Tobago	Americas	57329	4096.43	1696.00	121.19	0.30	0.54
118	Madagascar	Africa	43626	157.55	963.00	3.48	0.01	0.02
119	Syrian Arab Republic	Eastern Mediterranean	43146	246.54	2560.00	14.63	0.02	0.07
120	Sudan	Eastern Mediterranean	40433	92.21	2995.00	6.83	0.01	0.03
121	Malta	Europe	37639	7314.74	461.00	89.59	0.53	0.40
122	Mauritania	Africa	37222	800.53	794.00	17.08	0.06	0.08
123	Gabon	Africa	35525	1596.10	239.00	10.74	0.12	0.05
124	Guinea	Africa	30653	233.41	385.00	2.93	0.02	0.01
125	Papua New Guinea	Western Pacific	29715	332.12	370.00	4.14	0.02	0.02
126	United Republic of Tanzania	Africa	26154	43.78	725.00	1.21	0.00	0.01

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127	Togo	Africa	26068	314.88	242.00	2.92	0.02	0.01
128	Benin	Africa	24749	204.15	161.00	1.33	0.01	0.01
129	Haiti	Americas	23823	208.93	662.00	5.81	0.02	0.03
130	Bahamas	Americas	22396	5695.19	643.00	163.51	0.41	0.73
131	Somalia	Eastern Mediterranean	21998	138.41	1208.00	7.60	0.01	0.03
132	Lesotho	Africa	21635	1009.92	658.00	30.72	0.07	0.14
133	Burundi	Africa	20078	168.85	14.00	0.12	0.01	0.00
134	Mauritius	Africa	17812	1400.57	176.00	13.84	0.10	0.06
135	Barbados	Americas	17763	6181.12	153.00	53.24	0.45	0.24
136	Congo	Africa	17670	320.22	278.00	5.04	0.02	0.02
137	Mali	Africa	16039	79.20	563.00	2.78	0.01	0.01
138	Burkina Faso	Africa	14793	70.77	214.00	1.02	0.01	0.00
139	Iceland	Europe	13492	3705.23	33.00	9.06	0.27	0.04
140	Djibouti	Eastern Mediterranean	13478	1364.17	181.00	18.32	0.10	0.08
141	Equatorial Guinea	Africa	13368	952.83	167.00	11.90	0.07	0.05
142	Nicaragua	Americas	12866	194.22	208.00	3.14	0.01	0.01
143	South Sudan	Africa	12402	110.79	133.00	1.19	0.01	0.01
144	Central African Republic	Africa	11579	239.74	100.00	2.07	0.02	0.01
145	Gambia	Africa	9967	412.43	340.00	14.07	0.03	0.06
146	Yemen	Eastern Mediterranean	9779	32.79	1880.00	6.30	0.00	0.03
147	Eritrea	Africa	6816	192.19	45.00	1.27	0.01	0.01
148	Sierra Leone	Africa	6398	80.21	121.00	1.52	0.01	0.01
149	Niger	Africa	6339	26.19	212.00	0.88	0.00	0.00
150	New Zealand	Western Pacific	6233	129.26	28.00	0.58	0.01	0.00
151	Guinea-Bissau	Africa	6133	311.64	141.00	7.17	0.02	0.03
152	Liberia	Africa	5812	114.91	287.00	5.68	0.01	0.03
153	Bermuda	Americas	5647	9068.14	101.00	162.19	0.66	0.73
154	Chad	Africa	5069	30.86	174.00	1.06	0.00	0.00

Key: CT= Cummulative Total

CTPMP= cumulative total per 100000 population

Sources and data used were provided under Latest Updates from WHO/World meter's on 31st October, 2021

Figures obtained for USA were used as the comparism factor (CF), which is a ratio of figure obtained to the respective country population divided by the value obtained for USA.

Values of CF1 and CF2 represent case/incidence and mortality index.

Factor of more than 1 = very high infection and mortality index

Factor of approximately 1 = high infection and mortality index

Factor of ≤ 1 but ≥ 0.5 = moderately high infection and mortality index

Factor of ≤ 0.5 but ≥ 0.1 = low infection and mortality index

Factor of < 0.1 = very low infection, mortality and recovery index

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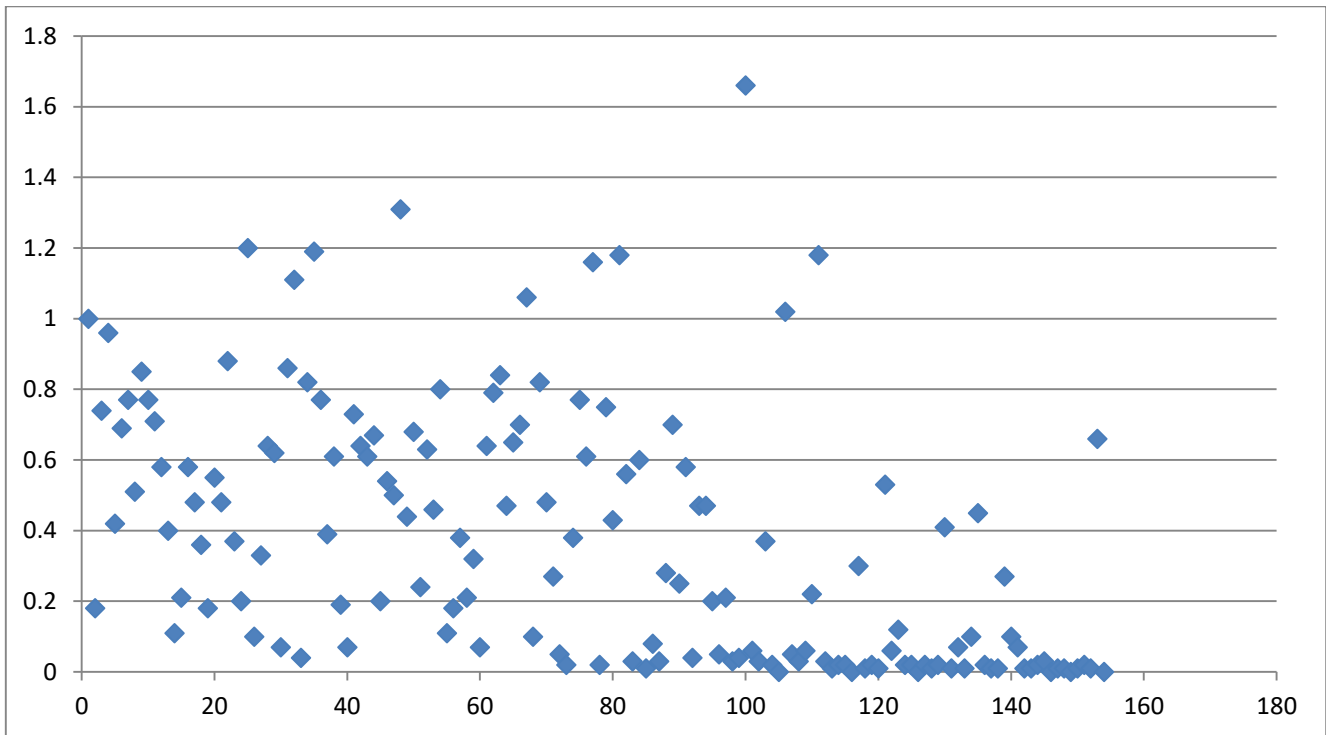


Figure 1: graph comparing infection case per country relative to USA

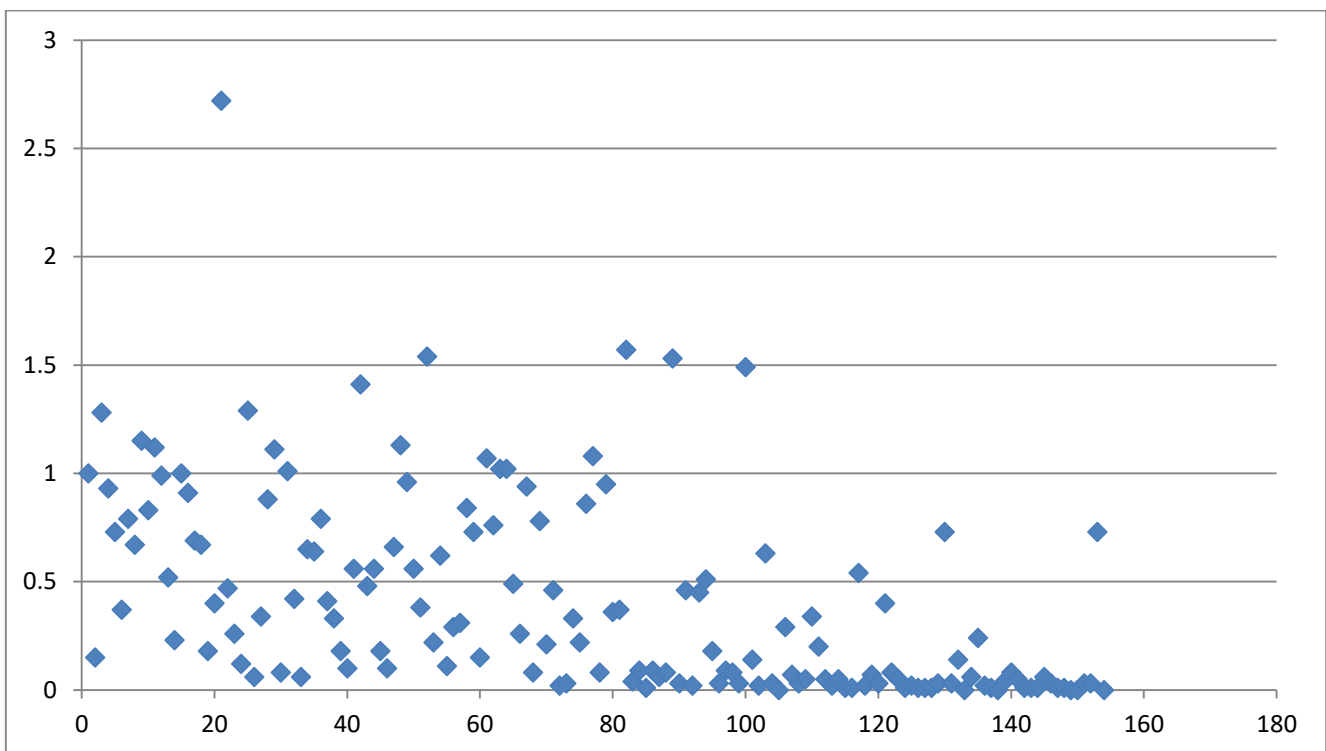


Figure 2: graph comparing infection case per country relative to USA

DISCUSSION

The COVID-19 pandemic, has affected hundreds of million persons, while it has resulted in the death of about five million human life worldwide. It also presents an unprecedented challenge to public health, food systems and the world of workforce [20]. The economic and social disruption caused by the pandemic is still unquantifiable. The highly infectious COVID-19 Delta variant has been indentified and reported in several countries, and it could affects hundreds and possibly thousands to millions of deaths if not properly contained[21]. Luckily enough, vaccines have recently been developed by different countries and companies to protect against the virus. The high cost of vaccination and low quantity produced and supplied relative to world population has

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made it necessary to determine the distribution and availability of the vaccine across regions and countries based on relative urgency and emergency[22]. Hence, there is the need to understand the morphology, demographic and potential mechanisms of infectivity and adaptability in different countries.

Immunological studies have revealed a steady decline of antibody levels among vaccinated individuals[23,24]. Long-term follow-up of vaccine trial participants has revealed a growing risk of breakthrough infection[25]. And health-care records from countries such as Israel, the United Kingdom and elsewhere all show that COVID-19 vaccines could be losing their strength, at least when it comes to keeping a lid on transmissible disease. What remains unclear, however, is to what degree the immune system's safeguards that protect vaccinated people against severe disease, hospitalization and death might be fading as well. Neutralizing antibodies that can intercept viruses before they infiltrate cells might not have much staying power. It has been observed that levels, of these molecules typically shoot up after vaccination, and then quickly taper off months later[26,27].

But cellular immune responses are longer lasting. Cellular immunity protect from the body disease. Memory B cells, which can rapidly deploy more antibodies in the event of re-exposure to the virus, tend to stick around, and so do T cells, which can attack already-infected cells[28,29]. Both provide an added measure of protection should SARS-CoV-2 sneak past the body's first line of defence. In one of the only long-term studies to consider these three planks of the immune system simultaneously — antibodies, B cells and T cells — researchers found that vaccination spurred durable cellular immunity[25]. Memory B cells continued to grow in numbers for at least six months period, and tends to get better at fighting the virus over time. T-cell counts remained relatively stable, dipping only slightly over the duration of the study period[30,31].

B cells in these structures randomly mutate their genes to create entire new sets of antibodies. Those cells that produce the best antibody repertoires eventually win out through an evolutionary process that augments the immune system's ability to fight off Delta and other SARS-CoV-2 variants of concern. Real-world data from diagnostic-testing records and hospital databases suggest this view. In Israel, for example, elderly people who got their shots at the beginning of the year seemed to have almost double the risk of severe illness during a July outbreak compared with similar individuals who were immunized more recently[32]. As researchers recently reported that older individuals given a third dose of vaccine were less likely to be infected and much less likely to develop severe disease than individuals who have not received the boosters[33].

This study shows that Africa, known for poor health facilities, dreadfully unhealthy environment and indisputably still the world most underdeveloped region surprisingly has the least covid-19 infection and mortality case. Most African communities exist as a community and in dense clusters which is a strong contrast to most developed countries that are more solitary. Therefore, there is a higher chance that the virus may have circulated among high number of the Africa populace. Reasons for this positively unexpected figures has puzzled observers the world over. Previous works have attempted possible explanation for the globally available data. Environmental, Evolutionary and adaptive immune response to the virus may have caused low infectious and mortality case in Africa. It has also been observed that, African-American population is more affected by COVID-19 compared to other race in the USA[34,35,36]. Therefore, it is less likely to be genetic, but more likely related to the environment. Babraham Institute (2020) studied immune responses of African children compared to Dutch children. It was observed, that the immune systems of African children develop faster than those of Dutch children[37]. Exposure to bacteria, viral and fungi pathogens in childhood may have contributed to strengthen the immune system and protect children from developing allergies, asthma and other infectious diseases, on subsequence exposure to the same/similar allergen/pathogen or cross allergen/pathogen. This supports the 'hygiene hypothesis[38,39], which contends that such diseases are more common in the developed world where the prevalence of antibiotics and antibacterials reduce children's exposure to microbes[40,41]. Thus, early exposure to some diseases in Africa may have resulted in a more robust innate and/or adaptive immune response. As a result countries in Africa are both vulnerable and potentially more resilient to the coronavirus.

CONCLUSION

COVID-19, is not only a global pandemic and public health crisis; it has also severely affected the global economy and financial markets. At some point it caused the world to stand still, it struggles and watch how the virus unleashed it mayhem. African continent has been crippled by fear of possible consequences rather than the actual infection by the virus. Possible reasons why Africa is least affected in spite of popular expectations is yet to be fully understood. Also, Africa is a favourable home to several viral diseases such as chicken pox, Ebola, dengue fever, small pox, measles, and polio disease some of which the body system has found a way to developed and evolved to cope with. This may have caused direct or indirect cross immunity that later became beneficial on exposure to same, similar or different viral infection including corona virus disease.

Also, there may have been rapid transmission of the virus across the population within the shortest possible time. This means most Africans may have been exposed to the virus without showing noticeable symptoms and may have fully recovered, while

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only few people have shown symptom to it. Therefore, there is need for COVID-19 antibody testing, which will reveal better picture of who has been exposed than the current antigen testing which only provides active disease information. This will immensely reduce the quantity and cost of vaccine that a give region may need.

The study also shows that, like every other continents, Africa needs vaccine, but in an emergency capacity when compared to western world its survival may not be desperately dependent on it, because most individuals in Africa countries may have been naturally and unconsciously immune.

RECOMMENDATION

More studies and surveys need to be conducted to understand the virus infectivity and it significances to Africa and maybe the rest of the world.

CONFLICT OF INTEREST

The authors declare that there are not any potential conflicts of interest

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AUTHORS' CONTRIBUTIONS

Joseph OS and Joseph OT were involved in collection of data and development of model for analysis. Joseph OS, Joseph OT and Adeoye DA were responsible for analysis and writing of this manuscript.

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